

ARTHROPLASTY SOCIETY OF AUSTRALIA GUIDELINES FOR VTE PROPHYLAXIS FOR HIP AND KNEE ARTHROPLASTY

Introduction

Hip and knee arthroplasty continues to be amongst the most successful medical interventions for improving quality of life. However, these interventions are a balance of benefit and exposure to risks. The increased risk of death following hip and knee arthroplasty surgery is well documented by population studies. The mortality risk of patients in the age most likely to have a joint replacement is 0.1% per day and this risk is increased by a further 0.12% until 26 days following surgery (1). The leading causes of patient mortality following arthroplasty surgery are cardiovascular (2), but thromboembolic mortality and morbidity are an important problem and potentially amenable to risk reduction.

Despite the increasing administration of various chemoprophylactic agents, there has been little impact on the incidence of fatal and non-fatal pulmonary embolus (PE) over the last 10-15 years.(2,3). Several large studies of adequate power have not demonstrated improved VTE prophylaxis or improved all-cause mortality with more aggressive chemical agents compared to aspirin. (4-6).

At the present time there is no universally accepted risk tool to measure VTE risk following arthroplasty surgery. The American Academy of Orthopaedic Surgeons attempted to stratify patients into low-risk and high-risk groups for VTE risk but found an absence of reliable data to complete the task. Despite these difficulties it seems reasonable to risk-stratify patients and there is some data reporting similar VTE complications in low-risk and high-risk patients but less bleeding complications with a targeted anticoagulation approach (7-11). The genetic propensity to develop unprovoked and post-operative VTE in some patients is well known. Conversely, conditions such as cardiac failure are associated with an increased VTE risk in medical patients but stable cardiac failure in elective surgical patients is a minor risk. More recently large national registries and institutional data bases have further refined the VTE risk in arthroplasty patients and forms the basis of this societies risk assessment for VTE risk specific to hip and knee arthroplasty surgery. (12-14)

The Arthroplasty Society of Australia considers literature, large databases including national health services and registries, and guidelines of NHMRC, AAOS, ACCP, RACS and other learned organizations to formulate aggregated guidelines, evidence based and evaluated by practicing arthroplasty surgeons in Australia. The guidelines use a risk stratification methodology.. All arthroplasty surgery is associated with an increased VTE risk termed 'routine' risk and some patients have an additional VTE risk termed 'high risk'. The guideline is a generic starting point of a targeted anticoagulation pathway for 'standard-risk' and 'high-risk patients'. All patients require an individualized risk assessment and they will require a re-evaluation of their VTE prophylaxis during their treatment.

The Society has divided patients undergoing THR (Total Hip Replacement) and TKR (Total Knee Replacement) into routine-risk (of PE and bleeding) and high-risk according to the attached list of predisposing factors and pre-existing conditions (see Appendix A)

1. General Considerations- for all patients independent of risk assessment

1. Early mobilisation post arthroplasty
2. Spinal anaesthesia
3. Use/ non use of tourniquet in TKR
4. Bleeding mitigation including tranexamic acid and delaying chemical anticoagulation until bleeding stabilises
5. VTE prophylaxis should be 3 to 6 weeks after joint replacement
6. If patient already on warfarin or Plavix for a cardiac condition, recommend consultation with cardiologist.
7. Plavix (clopidogrel) should be ceased at 7 days from surgery and warfarin 5 days from intended surgery. Bridging medication may be appropriate (eg aspirin).
8. DOACs (direct oral anticoagulants eg Rivaroxaban, Apixaban) need to be stopped a few days before major surgery, depending on renal function.

2. Patients with Routine Risk Of VTE

Peri-operative options include:-

1. Sequential compression device (SCD) and
2. Aspirin- 100-300mg per day or
3. Potent anticoagulation (LMWH, Warfarin, DOAC)

3. Patients with High Risk Of VTE (see Appendix A)

Peri-operative options include:-

1. SCD in combination with:
2. Warfarin – return to pre op level or if not previously on warfarin ≥ 2
3. LMWH
4. DOAC (eg Rivaroxaban)
5. IVC filters (evidence for the benefits in arthroplasty patients is very weak)

4. Patients with High Risk of Bleeding (see Appendix A)

Peri-operative options include:-

1. SCD

Post Operative

Patients with proven symptomatic DVT below the knee should be treated with 300mg aspirin, NOAC or LMWH per day with follow up ultrasound at 2 weeks. If progression detected, formal anticoagulation treatment should be instituted (5)

Appendix A

Conditions That Place Patients at Increased Risk of PE and/ or Major Bleeding (Compared With Other Patients Undergoing THR and TKR)

1. Increased Risk of PE

Major Criteria (one or more)

1. *Hypercoagulability conditions **
2. *Metastatic cancer*
3. *Stroke (occlusion or stenosis with infarction)*
4. *Chronic Obstructive Pulmonary Disease (COPD)*
5. *Sepsis*

Minor Criteria (three or more)

1. *Immobility ***
2. *History of VTE (PE and proximal DVT)*
3. *Tamoxifen and oestrogen therapy ****
4. *Medical comorbidities; Charlston index ≥ 3 , cardiac failure, advanced renal impairment*
5. *Lymphoma, myeloproliferative disorder*
6. *Obesity, BMI > 30*
7. *Severe weight loss*
8. *Acute MI*
9. *Knee replacement (greater risk than THR)*

* *Hypercoagulability conditions (protein C and protein S deficiency, antiphospholipid antibodies, antithrombin deficiency, factor V Leiden, acquired or congenital thrombophilias, prothrombin mutation 20210A, SLE inhibitor)*

***Immobility, institutionalized patients, prolonged bed rest, severe pain, ileus, fracture*

****Immobility. Age >80 is controversial: HR of 1.7 in USA and 0.89 in Denmark. Consider frail elderly as a risk.*

****Tamoxifen and oestrogen therapy, recommend cease oestrogen OCP and HRT 4 weeks pre op*

2. Increased Risk of Major Bleeding

a. Preoperative Conditions

1. *Known bleeding disorder*
2. *History of bleeding on chemoprophylactic agents*
3. *History of major gastrointestinal bleeding*
4. *History of haemorrhagic stroke*
5. *History of other major bleeding event*

b. Perioperative Events

1. *Revision THA/TKA with extensive exposure*
2. *Major surgical bleeding*
3. *Other major bleeding episode.*

Appendix B

Society Guidelines

1. *Clinical Practice Guideline-for the prevention of venous thromboembolism for patients admitted to Australian Hospitals.- NHMRC Dec -2009*
2. *The Australian and New Zealand Working Party on the Management and Prevention of Venous Thromboembolism- Best Practices for Australia and New Zealand- 4th Edition*
3. Parvizi J., Azzam K, Rothman RH, 'Deep Venous Thrombosis Prophylaxis for Total Joint Arthroplasty; American Academy of Orthopaedic Surgeons Guidelines'. *J. Arthroplasty 2008; 23 Suppl 1*
4. American Academy of Orthopaedic Surgeons (AAOS). American Academy of Orthopaedic Surgeons clinical practice guideline on preventing venous thromboembolic disease in patients undergoing elective hip and knee arthroplasty. American Academy of Orthopaedic Surgeons clinical practice guideline on preventing venous thromboembolic disease in patients undergoing elective hip and knee arthroplasty. Rosemont (IL): American Academy of Orthopaedic Surgeons (AAOS); 2011. 824
5. American College of Chest Physicians (ACCP). Prevention of VTE in orthopedic surgery patients: antithrombotic therapy and prevention of thrombosis, 9th ed: American College of Chest Physicians evidence-based clinical practice guidelines. *Chest. 2012 Feb;141(2 Suppl):e278S-325S*
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14. Pedersen AB, Sorensen HT, Mehnert F, Overgaard S, Johnsen SP.. Risk Factors for Venous Thromboembolism in Patients Undergoing Total Hip Replacement and Receiving Routine Thromboprophylaxis. J Bone and Joint Surgery. 2010, Sep 15;92(12):2156-64. doi: 10.2106/JBJS.I.00882.

Revision History		
Revision	Author(s)	Date
Creation	GM,DGC	May 2010
Revision 1	DGC, PY, PS	September 2016
Revision 2	DGC, PY, PS	December 2017

GM Graham Mercer, DGC , David Campbell, PY Piers Yates, PS Paul Smith

Appendix C

Examples of current protocols

PROTOCOL FOR DVT PROPHYLAXIS FOR PATIENTS UNDERGOING TOTAL HIP REPLACEMENT (THR) AND TOTAL KNEE REPLACEMENT (TKR) AT REPATRIATION GENERAL HOSPITAL (RGH) SOUTH AUSTRALIA

Patients undergoing THR and TKR at RGH are to be divided into high and low risk categories according to the attached list of predisposing factors and pre-existing conditions.

1. High Risk Patients

A) Increased risk of VTE (Venous Thrombotic Episode)

a) If patient preoperatively on warfarin, to return to pre operative INR as soon as practical.

- SCD / Foot pumps
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- To commence warfarin on night of surgery, using Southern Health Protocol for initial high dose loading, covered by Clexane 1mg/kgm /day until INR reaches desired level
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b) If patient not preoperatively on warfarin,

- SCD / Foot pumps
- Commence Warfarin, night of surgery
- Enoxaparin 40mg/ day until INR > 2
- Consider 20 mg/ day in elderly patients, weight <50kg or GFR <30
- Consider IVC filter
-
-

B) Increased risk of bleeding

Peri-operative options include

- sequential compression device pump (SCD)
- Consider Inferior vena cava (IVC) filter

2. Low Risk Patients

A) For compliant patients:-

- SCD pumps to be applied in the operating theatre and can be used either intra-operatively (sterile pumps are available) or on completion of surgery.
-
- coated aspirin 150 mg per day orally to commence post-op day one and continue for 6 weeks from surgery
- If patient on other anti-platelet/ anti-coagulant to commence night of surgery.
- patients preoperatively on Plavix or other; recommence post op day one with Aspirin or is sensitive to Aspirin commence Plavix alone.
- If sensitive to Aspirin and not on any other anti-platelet / anti-coagulant to commence Rivaroxaban 10 mg daily on night of surgery and continue for 14 days post operatively for TKR and 35 days post operatively for THR.

B) For non compliant patients:-

- pumps not suitable
- coated aspirin 150 mg per day orally to commence post-op day one and continue for 6 weeks from surgery
- patients preoperatively on Plavix or other; recommence upon discharge or post-op day one.

Precautions.

- Below knee DVT once detected, to be treated with Aspirin 300mgm per day with (repeat) ultrasound review two weeks from incident diagnosis.
- More proximal DVT/ PE once detected, to be treated with warfarin under physician guidance
- Use of compression stockings to be considered only where significant lymphoedema is present and where patient has assistance in application
- Clopidogrol (Plavix) and similar agents should be ceased 10 days before surgery (in consultation with patient's cardiologist)
- Warfarin can be reversed for a 24 hour window with Prothrombin X
-

. December 2017 Dr Chris Wilson.

Joint Replacement Surgery Management Guide

FREMANTLE HOSPITAL AND HEALTH SERVICE
JOINT REPLACEMENT MANAGEMENT GUIDE

(Total Hip Replacement (THR) and Total Knee Replacement (TKR))

August 2015

Joint Replacement Guideline 3: ANTICOAGULANTS & ANTIPLATELET MEDICATIONS

****Management must always be individualised for each patient and this guide should only be applied where no contraindications exist.****

Warfarin (refer to FHHS Intranet: Warfarin Reversal Guidelines)

- ✓ The indication for warfarin therapy should be clarified on admission, to help determine the need for other bridging anticoagulation (IV heparin or SC enoxaparin) peri-operatively
- ✓ Warfarin should be actively reversed preoperatively to minimise time to surgery, rather than allowing INR to fall passively
- ✓ **Successful reversal is INR \leq 1.4**
- ✓ For patients with prosthetic heart valves, discussion with Cardiologist or Cardiothoracic Surgeon is suggested to determine the degree of warfarin reversal and bridging anticoagulation
- ✓ For patients with recent thromboembolism, discussion with Haematologist is suggested
- ✓ Recommencement of warfarin postoperatively may occur as soon as it is clinically safe to do so, or when the bleeding risk is considered minimal by the orthopaedic team

Aspirin

- ✓ Aspirin therapy increases bleeding, and should be ceased 5 days before surgery unless it is required for coronary or cerebrovascular prophylaxis, when it should be continued (Refer to FHHS [Drug Bulletin](#))

Clopidogrel

Indication for clopidogrel needs to be confirmed before decision to withhold treatment with the cardiologist involved.

If previous DVT/PE discharge on Warfarin with target INR 2 (or equivalent). Otherwise discharge on Aspirin 150 mg daily for 4 weeks

Joint Replacement Guideline 5: OTHER MANAGEMENT PRIORITIES

Management must always be individualised for each patient and this guide should only be applied where no contraindications exist.**

Thromboprophylaxis:

- ✓ Assess all patients for risk
- ✓ Maintain adequate hydration and encourage early mobilisation
- ✓ Calf pumps to be put on in recovery and worn until fully mobile
- ✓ Clexane® (Enoxaparin) 40 mg SC daily (or 20 daily for patients with impaired renal function) should be charted on the Anticoagulation Medication Chart for 8AM next day.
- ✓ Aspirin 150mg on discharge for 4 weeks
- ✓ High risk:- Clexane 6 hrs after surgery, consider Warfarin (INR 2) for six weeks starting on day after surgery

STANDING ORDERS

DVT PROPHYLAXIS FOR THR/TKR

Wakefield Orthopaedic Clinic

Patients undergoing THR and TKR are to be divided into routine and high risk categories according to the attached list of predisposing factors and pre-existing conditions.

ROUTINE RISK PATIENTS

- Sequential compression device pump / compliance chart to be activated upon application of pumps
- Coated aspirin 100mg per day orally to commence post-operative day one and continue for 4 weeks from surgery
- Patients pre-operatively on Plavix or other; recommence upon discharge or post-operative day five

HIGH RISK PATIENTS

INCREASED RISK OF VENOUS THROMBOTIC EPISODE

- Sequential compression device continued for duration of admission
- Clexane 40mg /day (CrCl < 30ml/min 20mg) until switch to Rivaroxaban/Apixaban
- Commence Rivaroxaban 10mg daily or Apixaban 5mg bd when haemodynamically stable, usually at discharge. Continue for until 4 weeks post operative.

INCREASED RISK OF BLEEDING

- Sequential compression device pump continued for duration of admission

PRECAUTIONS

- Below knee DVT once detected, to be treated with Aspirin 300mg per day with (repeat) ultrasound review two weeks from incident diagnosis
- More proximal DVT / PE once detected, to be treated with formal anticoagulation under physician guidance
- Use of compression stockings to be considered only where significant lymphoedema is present and where patient has assistance in application
- Clopidogrel (Plavix) and similar agents should be ceased 7 days before surgery (in consultation with patient's cardiologist)

APPENDIX A

Conditions that place patients at increased risk of PE and / or Major Bleeding (compared with other patients undergoing THR and TKR)

INCREASED RISK OF PE

Major Criteria (one or more)

1. Hypercoagulability*
2. Metastatic cancer
3. Stroke (occlusion or stenosis with infarction)
4. Chronic Obstructive Pulmonary Disease (COPD)
5. Systemic sepsis

Minor Criteria (three or more)

1. Immobility**
2. History of VTE (PE and proximal DVT)
3. Tamoxifen and oestrogen therapy***
4. Medical comorbidities; Charlston index ≥ 3 , cardiac failure, advanced renal impairment
5. Lymphoma, myeloproliferative disorder
6. Obesity, BMI > 30
7. Severe weight loss
8. Acute MI
9. Knee replacement (greater risk than THR)

* Hypercoagulability conditions, protein C and protein S deficiency, antiphospholipid antibodies, antithrombin deficiency, factor V Leiden, acquired or congenital thrombophilias, prothrombin mutation 20210A, SLE inhibitor)

** Immobility, institutionalized patients, prolonged bed rest, severe pain, ileus, fracture, frail elderly

*** Tamoxifen and oestrogen therapy, recommend cease oestrogen OCP and HRT 4 weeks pre op

INCREASED RISK OF MAJOR BLEEDING

PRE-OPERATIVE CONDITIONS

- Known bleeding disorder
- History of bleeding on chemoprophylactic agents
- History of major gastrointestinal bleeding
- History of haemorrhagic stroke
- History of other major bleeding event

PERI-OPERATIVE EVENTS

- Revision THA/TKA with extensive exposure, delay chemical prophylaxis until haemodynamically stable
- Major surgical bleeding
- Other major bleeding episode.

APPENDIX B

Published guidelines

1. Arthroplasty Society of Australia guidelines for VTE prophylaxis for hip and knee replacement <https://www.aoa.org.au/>
2. NHMRC Clinical Practice Guideline-for the prevention of venous thromboembolism for patients admitted to Australian Hospitals. Commonwealth Government Printing. 2009 (now withdrawn)
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MISCELLANEOUS *References*

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